WIRELESS COMMUNICATIONS SYSTEM AND METHOD HAVING AN EMERGENCY LOCATION AND VITAL SIGN MONITOR

FIELD OF THE INVENTION:

This invention relates generally to wireless communications systems and methods and, more particularly, to wireless communications systems and method for transponding biometric information, such as vital signs, from an individual to a remote site in conjunction with information that identifies a location of the individual.

BACKGROUND OF THE INVENTION:

Various systems and methods are known in the art for recording an individual's vital signs, such as heart rate and/or pulse rate. For example, in U.S. Patent No.: 5,181,519, issued January 26, 1993, "Device for Detecting Abnormal Heart Muscle Electrical Activity", C.T. Bible describes a portable apparatus for monitoring heart muscle electrical activity. Electrical contacts receive electrical signals generated by the heart muscle and transmit the signals to a monitoring unit. Predetermined portions of the signal are used by the monitoring unit to identify the ST segment of the signal which is compared to a reference axis. If a series of ST signals deviate from the reference axis by some threshold the monitoring unit records data which is used for the diagnosis of myocardial ischemia. In U.S. Patent No.: 4,952,928, issued August 28, 1990, "Adaptable Electronic Monitoring and Identification System", G.T. Carroll et al. describe a personnel monitoring system that includes a transmitting or transponding unit that is worn by a person. The unit periodically or on demand transmits a signal that identifies the person being monitored, as well as information concerning the condition or activities of the person being monitored. The condition or activities are sensed by sensors that monitor selected body functions such as heart rate, amount of skin perspiration, muscle movement. A field monitoring device is positioned near to the person being monitored and receives, processes and stores the periodic or requested signals that are transmitted from the transmitting unit. In U.S. Patent No.: 5,228,449, issued July 20, 1993,

"System and Method for Detecting Out-of-Hospital Cardiac Emergencies and Summoning Emergency Assistance", A.G. Christ et al. describe a monitoring systems that monitors a pulse of a person wearing a wrist unit. The wrist unit sends RF signals to a base unit. If the wrist unit detects a cardiac arrest, or if the wearer signals an emergency, both the wrist unit and the base unit sound local alarms, and the base unit telephones others to alert them to the emergency. In U.S. Patent No.: 5,966,692, issued October 12, 1999, "Method and System for Monitoring the Heart of a Patient", A.A. Langer et al. describe a remote station that generates an electrocardiogram of a patient, a device for detecting predetermined cardiological events in the patient and a transmitter for transmitting the electrocardiogram. A central station is in continuous communication with the transmitter for receiving transmitted electrocardiogram when a predetermined cardiological event occurs.

It is also known in the art to enable a user location providing capability in a wireless communication system. For example, commonly assigned U.S. Patent No.: 6,061,561, issued May 9, 2000, "Cellular Communication System Providing Cell Transmitter Location Information", S. Alanara et al., discusses using base station location information to determine the location of a mobile station, such as when an emergency call is made. In U.S. Patent No.: 5,835,907, issued November 10, 1998, "Emergency PCS System for Identification and Notification of a Subscriber's Location", B. Newman describes the use of Global Positioning System (GPS) technology to determine a subscriber's exact location on a periodic basis. The location information (latitude and longitude) is converted by a Geographical Information System (GIS) to a "user-friendly" classification of a block, street, city, etc., which can then be automatically communicated to emergency services. In U.S. Patent No.: 6,073,004, issued June 6, 2000, "Emergency Call Initiator", S. Balachandran describes an emergency call initiation in response to a detection of vehicle accident. The Mobile Switching Center (MSC) utilizes location information from the base station of the cellular telephone to provide an emergency operator with emergency information.

The foregoing U.S. Patents do not provide a completely satisfactory solution to the

problem of providing emergency situation reporting for a mobile user or subscriber of a wireless communications system. That is, they stop short of providing an effective and full integration of an automatic sensing of an emergency situation from sensors on the user's body and the transmission of an emergency signal or call in combination with location information (e.g., GPS-derived location information), in combination with physician or other healthcare provider programmability of alarm thresholds and the like.

OBJECTS AND ADVANTAGES OF THE INVENTION:

It is a first object and advantage of this invention to provide an improved system and method for monitoring an individual's vital signs, for detecting an occurrence of an alarm condition, and for transmitting a signal to a remote location along with information that is descriptive of a location of the individual.

It is another object and advantage of this invention to provide an emergency locator and vital sign monitoring system that includes a wireless terminal coupled to sensors worn by an individual and that includes a hardware/software interface to an external computer, such as a personal computer, through which a physician or other healthcare provider is enabled to select from an array of suitable sensors and to select appropriate threshold levels for the individual for determining when an emergency situation has occurred.

It is a further object and advantage of this invention to provide an emergency locator and vital sign monitoring system that includes a wireless terminal, such as a cellular telephone handset, that is coupled by a low power link (such as a low power RF link) to sensors worn by an individual, where the sensors may include one or more of a heart muscle electrical signal sensor (e.g., EKG), a heart sound sensor, a pulse sensor, a blood pressure sensor, a body temperature sensor, a skin perspiration sensor, and/or a neurological activity sensor (e.g., EEG), all of which are considered herein to vital sign sensors, and to provide the wireless terminal with a hardware/software interface to an external computer for receiving at least threshold setting inputs therefrom.

SUMMARY OF THE INVENTION

The foregoing and other problems are overcome and the foregoing objects and advantages are realized by methods and apparatus in accordance with embodiments of this invention.

This invention seamlessly integrates several different technologies and links them together in a cell phone application using Bluetooth (or some other suitable Low Power Radio Frequency (LPRF) technology) as the medium to facilitate communication between the various devices.

In the presently preferred embodiment of this invention the user wears a system of sensors and related signal processing circuits capable of making a decision to summon emergency help. The decision is made automatically by comparing continuous, real-time inputs from, for example, at least one of heart, blood pressure and other vital signs sensors to pre-programmed levels. If a critical situation is detected, the unit sends a message, such as a LPRF message, to a cellular telephone or to some other type of wireless communication device, such as a PCS terminal. The message may also be sent to a network in the users' immediate environment, such as the home or office, which is capable of then contacting the cellular telephone or other type of wireless communication device. In response to the message, the cellular telephone dials an emergency number, such as a 911 number, and transmits not only its location coordinates, but also the vital signs of the user. Other information may also be sent, such as current medication taken by the user and/or medical history data and/or medication allergies. The vital signs information, as well as the other information, can be monitored by emergency personnel on the way to the user's location. This information may be important for achieving a rapid and accurate diagnosis, and may be impossible to obtain from an unconscious victim.

The vital signs and other (optional) information can be used to make decisions such as,

by example: a type of response (ambulance or life-flight); a type of equipment to deploy; and/or whether EMT personnel should seek specialist advice from a trauma center while on-route to the user's location.

In a presently preferred embodiment of this invention a hardware/software module or function that is located in or otherwise accessible by the cellular/PCS telephone or other wireless communication device can be programmed by the user's physician or by other qualified medical personnel in the physician's office. It is also within the scope of these teachings to provide a generic device with default settings using, for example, a personal computer (PC)- interface provided to a physician on a CD or other type of computer-readable media, or made available via the Internet (to registered recipients).. The cellular telephone may be programmed from the PC via, for example, a cable or an IR interface. The physician may select from an array of available sensors and select appropriate threshold levels for a particular user which would indicate an emergency condition for that particular user. The user's medical history information may also be encoded and stored in the device. The device may be tested in the physician's office.

The sensors themselves are preferably wearable by the user. An appropriate array of sensors (e.g., heart, blood pressure, pulse, skin temperature, etc.) are provided, as is an interface to the LPRF system that is compatible with the hardware and software of the cellular telephone or other wireless communication device.

The system components that are utilized thus include a wearable sensor kit or set with LPRF capability in conjunction with suitable hardware and software in the cellular telephone, including LPRF (or similar) capability. For remote use, such as in the home, it is preferred to provide at least one LPRF booster to increase the wireless link range to the home perimeter. A computer software application is also provided for enabling a physician or other qualified person to program "limits" into the cellular telephone, as is a cable or other suitable interface from the cellular telephone to the computer. If the cellular network does not support positioning via "triangulation", then a GPS module is preferably located in the cellular telephone or is interfaced as an accessory to the cellular

telephone. Also provided is hardware and software, external to the cellular telephone, for receiving and displaying updated vital sign information from the cellular telephone via the cellular network. This latter component may be installed in an ambulance for use by EMT personnel en-route to the location of the user. This information may be synthesized into a voice broadcast and received by a cellular receiver in the ambulance, such as by being patched through by the EMT dispatcher. The cellular receiver could comprise, by example, a PCMCIA card that is plugged into a laptop computer that is programmed to display the vital signs information received from the cellular network. The receiver could also comprise a device, such as a Nokia 9110i communicator, with advanced communications capability and software for displaying graphical or other information on the communicator's display. Other information stored in the user's phone, such as the user's medical history, may also be transmitted to the emergency personnel, and may be displayed or otherwise presented, such as by the use of voice synthesis. In these various embodiments a capability is provided to display vital signs and other information to the emergency personnel with the receiver or with a dedicated screen(e.g., a laptop computer) that is coupled to the receiver through a suitable link, such as a cable, a PCMCIA card, an IR link, or a LPRF link.

This invention represents a greatly increased utility to the user, as correct responses to the user's condition are facilitated during the important first few minutes after a trauma. This invention is especially useful for elderly or infirm persons living alone and/or in isolated places, and could help eliminate or reduce the need for hospice care.

This invention takes advantage of the introduction of E911 legislation by the FCC and integrates a number of technologies into a seamless solution facilitated by a wireless communicator handset, such as a cellular or PCS handset, and thus is mobile and sufficiently widespread to enhance the quality of life of elderly or infirm persons.

A method is disclosed for operating a wireless communication system, as is a wireless communications system that operates in accordance with the method. The method has steps of operating a set of vital signs sensors that are affixed to a user; transmitting

sensor-generated information to a wireless communicator such as a cellular/PCS telephone; comparing, in the wireless communicator, the sensor-generated information to a set of thresholds stored in or accessible by the wireless communicator and, upon an occurrence of sensor-generated information falling outside of a threshold, initiating an emergency call from the wireless communicator to an emergency response center. The emergency call includes at least some of the sensor-generated information as well as information describing a current location of the wireless communicator. The emergency call can further include other information that is descriptive of a medical condition of the user, such as the user's medical history and medications that are taken by the user. The other information can also be provided for use by the emergency services personnel, along with updated sensor-generated information that continues to be transmitted from the wireless communicator while the emergency services personnel are in route to the user. A physician's station can be provided for downloading the set of thresholds, and the optional other information, into a memory that is embedded within or removably installable within the wireless communicator.

BRIEF DESCRIPTION OF THE DRAWINGS

The above set forth and other features of the invention are made more apparent in the ensuing Detailed Description of the Invention when read in conjunction with the attached Drawings, wherein:

Fig. 1 is a simplified block diagram of a sensor unit, an optional booster unit, and a wireless communicator;

Fig. 2 is a simplified block diagram of certain ones of the system components of Fig. 1 arranged for use in a home environment;

Fig. 3 is a conceptual diagram showing signal flow in an exemplary embodiment of this invention, wherein the sensor unit/wireless communicator are coupled to a remote emergency response center; and

Fig. 4 is a logic flow diagram in accordance with a method of this invention.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 is a simplified block diagram of an emergency locator and vital sign monitoring system 10 that includes a sensor unit 12, a wireless communicator 14, such as a cellular telephone or a PCS communication device, and a physician station 16. The wireless communicator 14 is coupled to a wireless network 18.

It should be noted at the outset that the teachings of this invention are not limited to the use of "cellular" technology, which at least in the United States generally refers to the 800 MHz frequency band. For example, the teachings of this invention may be practiced as well with PCS technology, which encompasses the 1900 MHz frequency band. In general, the teachings of this invention employ "wireless" technology, which for the purposes of this invention is not intended to be limited to any specific frequency band(s), access types, modulation types, and the like.

The sensor unit 12 includes a set of sensors 20, a suitable sensor interface 22 and a low power link adapter, such as a low power RF (LPRF) interface 24. One LPRF link and interface known as "Bluetooth" is suitable for practicing this invention. During use, the sensors 20 are worn by a person (not shown), also referred to herein as a user. The sensors 20 may include one or more of a heart muscle electrical signal sensor (e.g., EKG), a heart sound sensor, a pulse sensor, a blood pressure sensor, a blood sugar sensor, a body temperature sensor, a skin perspiration sensor, and/or a neurological activity sensor (e.g., EEG), all of which are considered herein to vital sign sensors or more simply biometric sensors. In one embodiment a single type of sensor may be worn by the user, such as a pulse sensor. In other embodiments a plurality of different types of sensors may be worn by the user. In any case, the sensor interface 22 samples the outputs of the sensors 20 at a suitable sampling rate and converts the outputs of the sensors 20 to suitable electrical signals, such as digitized sensor signal data. The sensor

interface 22 could include various multiplexers, analog to digital converter(s) and/or a digital signal processor (DSP), as well as any other circuitry required to capture the user's vital signs and convert them to a form suitable for transmission to another location. In this case the transmission is through the LPRF interface 24 and LPRF link 25 to a compatible LPRF interface 26 of the wireless communicator 14.

The wireless communicator 14 also includes, as is customary, a data processor 28 that is bidirectionally coupled to a memory 30 and an RF transceiver 32. The memory 30 stores, in addition to the normal wireless communicator operating program, parameters and data, a program 30A for implementing the teachings of this invention, a set of programmed thresholds 30B against which the received sensor data is compared, and (optional) other information 30C, such as the user's medical history, a list of any medications that the user is taking, the name and contact information for the user's physician, and any other information that may be deemed pertinent to the user's medical situation or to the user, such as phone number of the user and/or a phone number of a relative or neighbor of the user. A possible type of emergency may also be programmed into the other information 30C, such as a possible type of emergency based on the user's known medical condition (e.g., heart attack, stroke, asthma attack). Preferably the other information 30C is information that supplements the vital signs sensor data information, and that would aid a medical care giver, such as emergency services personnel, to diagnose and/or treat the user should the user's sensor data indicate that one or more of the user's vital signs have fallen outside the range of programmed thresholds 30B.

It should be noted that the programmable part of the wireless communicator 14 need not be physically embedded in the communicator's hardware, but could be accessed as a program and/or data stored on a removable media card, such as a MMC or compact flash (CF) type of medium, and accessed through a suitable interface, such as a card slot coupled to the processor 28.

The RF transceiver 32 is used for coupling through a frequency channel or channels to the wireless network 18 using an applicable air interface standard and access type, such as CDMA, Wideband CDMA (WCDMA), TDMA, GSM, or analog (e.g., AMPS). The

specific type of air interface, modulation type, access type and the like are not germane to the operation or understanding of this invention, as the teachings of this invention can be used with all known types of wireless access types and air interface standards. If the wireless network 18 does not support a network-type of wireless communicator location function, such as triangulation, then the wireless communicator 14 preferably includes or is coupled to a location determination device, such as a Global Positioning System (GPS) subsystem 34. The output of the GPS subsystem 34, typically expressed in latitude and longitude, is preferably converted at some point using known techniques to a more readily used and understood format, such as street addresses and the like. The wireless terminal 14 also includes a link 36 to the physician station 16.

The physician station 16 is assumed to include a suitable computer, such as a personal computer (PC) 38, having an interface 40 to the link 36. The link 36 can be a wired or a wireless link, such as a cable, an IR link, or a LPRF link. Using a program installed in the PC 38 the physician, or any other qualified type of care giver or medical professional, is enabled to provide the programmed thresholds 30B for storage in the memory 30. By example, the programmed thresholds 30B can include, depending upon the specific types of sensors 20 that are in use, a minimum and maximum pulse rate and/or a minimum and maximum blood pressure and/or a minimum and maximum body temperature. If employed, the other information 30C can also be downloaded from the PC 38 for storage in the memory 30. Alternatively, one or more of the thresholds may be default thresholds, and not necessarily specific to the user (e.g., a default body temperature range may be used).

The invention assumes that the sensor unit 12 and the wireless communicator 14 are positioned relative to one another such that the LPRF link 25 is operable. Should greater distances be foreseeable, then one or more LPRF booster or repeater units 42 (shown in Fig. 2) can be used for enabling reliable communication to be accomplished between the sensor unit 12 and the wireless communicator 14.

Fig. 2 shows an exemplary in-home or in-office application, wherein the sensor unit 12

is assumed to be worn by the user, and where the wireless communicator 14 is placed or installed at some location within the home or office. One or more of the repeater (booster) units 42 are positioned at various locations to insure that when the LPRF interface 24 of the sensor unit 12 is out of range of the LPRF interface 26 of the wireless communicator 14, that the repeater unit 42 is enabled to relay the transmission from the sensor unit 12 to the wireless communicator 14.

Fig. 3 is a diagram showing the signal flow in an exemplary embodiment of this invention, where the sensor unit 12 and wireless communicator 14 are coupled to a remote emergency response center 44 via the wireless network 18. Reference can also be made to Fig. 4. At step A the wireless communicator program 30A periodically monitors (e.g., every five seconds) the outputs of the sensor unit 12, and compares at step B the various sensor data to the corresponding programmed thresholds 30B. In response to detecting that one or more of the user's monitored vital signs are out of the threshold range 30B programmed by the physician station 16, at step C the program 30A automatically causes the wireless communicator 14 to initiate an emergency call (e.g., a 911 call). As a part of the emergency call the wireless communicator 14 preferably also transmits: (a) an indication of which monitored vital sign or signs has fallen outside of the programmed thresholds 30B; the sensor data for the at least the affected sensor(s), although all the data from all sensors may be sent as well; the location of the wireless communicator (if known); and (d) the other information 30C (if available). If the location information is not known, and if the wireless network 18 supports position location of the wireless terminal 14 (e.g., using triangulation from at least one base station), then the wireless network 18 appends the location information to the transmission (as mandated by FCC rules regarding E-911). At step D the wireless network 18 relays the sensor data, location data and other information data (if available) to the called emergency response center 44, which dispatches emergency services personnel in emergency vehicle 46 to the indicated location of the wireless terminal 18. The indicated location is assumed to coincide with the location of the user. In a preferred embodiment of this invention the emergency services personnel in vehicle 46 are also provided with the user's vital signs and the other information (if available). Further in accordance with the this invention the sensor unit 12 and the wireless

communicator 14 continue to transmit the user's vital sign data to the wireless network 18, which is then relayed directly through a wireless frequency channel or indirectly (via the emergency response center 44) to the emergency services personnel associated with vehicle 46. For example, for the case where the wireless network 18 includes a cellular telecommunications network, the network may place a call to a cellular telephone contained within the emergency services vehicle (e.g., ambulance or helicopter), and transmit the updated vital signs information as part of the call. The vital signs information could be simply numeric data (e.g., pulse rate, blood pressure, etc.) or it could be supplemented with audio information, such as monitored heart sounds. It is assumed that a suitable signaling protocol is agreed upon so that the end user of the vital signs information is enabled to separate and distinguish the various data that is received.

As was discussed previously, the emergency services vehicle 46 is provided with hardware and software (46A, 46B, 46C) for receiving and displaying updated vital sign information that is received from the wireless network 18. The received information may be synthesized into a voice broadcast and received by a cellular/PCS receiver in the vehicle 46, such as by being patched through by the EMT dispatcher at response center 44. The receiver 46A could comprise, by example, a PCMCIA card-based wireless phone that is plugged into a laptop computer or some other data processor (DP) 46C that is programmed to show on a display 46B the vital signs information received from the wireless network. The receiver 46A could also comprise a device, such as a Nokia 9110i communicator, with advanced communications capability and software for displaying graphical or other information on the display 46B. Other information stored in the user's phone 14, such as the user's medical history, may also be transmitted to the emergency personnel, and may be displayed or otherwise presented in the vehicle 46, such as by the use of voice synthesis. In these various embodiments a capability is thus provided to display vital signs and other information to the emergency personnel using a display of the receiver 46A or with a dedicated screen 46B(e.g., the display screen of a laptop computer 46C) that is coupled to the receiver 46A through a suitable link 46D, such as a cable, a PCMCIA card, an IR link, or a LPRF link.

The vital signs information, as well as the optional other information, may thus be monitored by emergency services personnel in vehicle 46 on the way to the user's location. This information may be important for achieving a rapid and accurate diagnosis, and may be impossible to obtain from an unconscious victim. The displayed vital signs and (optional) other information can be used to make decisions such as, by example, the type of response (ambulance or life-flight), the type of equipment to deploy; and/or whether the emergency services personnel should seek specialist advice from a trauma center while on-route to the user's location.

It is within the scope of these teachings for the wireless communicator 14 to provide an audible alert before and/or while placing the emergency telephone call so as enable the user to override and cancel the call if the call is being made in error.

Although the invention has been described in the context of certain types of sensors 20, certain types of other information 30B, and certain types of location determination procedures, those skilled in the art should appreciate that these are merely exemplary of the teachings of this invention, and should not be construed in a limiting sense upon the practice of this invention. For example, while the other information 30C has been disclosed as being stored in the memory 30 of the wireless communicator 14, it is within the scope of these teachings to instead store all or a portion of the other information within a memory contained within the sensor unit 12, and to then transmit the other information to the wireless communicator 14 upon receiving a command from the wireless communicator via the LPRF link 25.

It can be appreciated that the emergency services response center 44 could be a public safety answering point (PSAP), or it could be a privately-operated enterprise.

Also, it is within the scope of these teachings to packetize the vital signs, location information and (optional) other information in the wireless communicator 14, and to transmit same as packet data to the emergency services response center 44, via wireless network 18. In this embodiment the wireless network 18 is assumed to support packet

data, and may be or may include a General Packet Radio Service (GPRS) or other type of packet radio network such as EDGE or HDR. The user's vital signs and other information may be delivered to the emergency services response center 44 and/or to the emergency services personnel in vehicle 46 via the Internet or some other packet data communications network.

Thus, while the invention has been particularly shown and described with respect to preferred embodiments thereof, it should be understood by those skilled in the art that changes in form and details may be made to these teachings without departing from the scope and spirit of the invention.

CLAIMS

What is claimed is:

1. A method for operating a wireless communication system, comprising steps of:

operating a set of vital signs sensors that are affixed to a user;

transmitting sensor-generated information to a wireless communicator;

comparing, in the wireless communicator, the sensor-generated information to a set of thresholds stored in the wireless communicator; and

upon an occurrence of sensor-generated information falling outside of a threshold, initiating an emergency call from the wireless communicator to an emergency response center via a wireless communications network, the emergency call including at least some of the sensor-generated information and information describing a current location of the wireless communicator.

2. A method as in claim 1, wherein the information describing a current location of the wireless communicator is generated by the wireless communicator.

3. A method as in claim 1, wherein the information describing a current location of the wireless communicator is generated by a wireless network that receives the emergency call.

4. A method as in claim 1, wherein the emergency call further comprises other information that is descriptive of the user.

5. A method as in claim 1, wherein the emergency call further comprises other

information that is descriptive of a medical history of the user.

6. A method as in claim 1, wherein the emergency call further comprises other information that is descriptive of a medical condition of the user.

7. A method as in claim 1, and further comprising an initial step of storing the set of thresholds within a memory accessible by the wireless communicator.

8. A method as in claim 1, and further comprising an initial step of operating a computer to load the set of thresholds into a memory that is accessible by the wireless communicator.

9. A method as in claim 1, and further comprising an initial step of operating a computer to load the set of thresholds into a memory that is accessible by the wireless communicator, along with other information that is descriptive at least in part of user medical-related information .

10. A method as in claim 1, and further comprising steps of:

in response to the emergency call, dispatching emergency service personnel to the current location of the user terminal;

continuing to operate the set of vital signs sensors and to transmit sensor-generated information to the wireless communicator; and

transmitting updated sensor-generated information from the wireless communicator for use by the emergency services personnel.

11. A method as in claim 10, wherein the emergency call further comprises other information that is descriptive of a medical condition of the user, and further comprising a step of providing the other information for use by the emergency services personnel.

12. A method as in claim 1, wherein the step of transmitting the sensor-generated information to the wireless communicator comprises a step of repeating the transmission with a repeater unit so as to extend the transmission range.

13. A wireless communication system, comprising:

a set of vital signs sensors that are affixed to a user; and

a transmitter for transmitting sensor-generated information to a wireless communicator, said wireless communicator comprising a data processor that is programmed for comparing the sensor-generated information to a set of thresholds stored in a memory that is accessible by the wireless communicator and, upon an occurrence of sensor-generated information falling outside of a threshold, for initiating an emergency call from the wireless communicator to an emergency response center via wireless communications network, the emergency call comprising at least some of the sensor-generated information and information describing a current location of the wireless communicator.

14. A system as in claim 13, wherein the information describing a current location of the wireless communicator is generated by the wireless communicator.

15. A system as in claim 13, wherein the information describing a current location of the wireless communicator is generated by a wireless network that receives the emergency call.

16. A system as in claim 13, wherein the emergency call further comprises other information that is descriptive of the user.

17. A system as in claim 13, wherein the emergency call further comprises other information that is descriptive of a medical history of the user.

18. A system as in claim 13, wherein the emergency call further comprises other information that is descriptive of a medical condition of the user.

19. A system as in claim 13, wherein said wireless communicator further comprises an interface for receiving the set of thresholds from an external data processor for storage within said memory.

20. A system as in claim 13, wherein said transmitter comprises a low power RF (LPRF) transmitter.

21. A system as in claim 13, wherein said wireless communicator further comprises an interface for receiving the set of thresholds from an external data processor for storage within said memory, along with other information that is descriptive at least in part of user medical-related information .

22. A system as in claim 13, wherein said medical response center is responsive to the emergency call for dispatching emergency service personnel to the current location of the user terminal; wherein the set of vital signs sensors continue to operate and to transmit sensor-generated information to the wireless communicator, and wherein the wireless communicator transmits updated sensor-generated information from the wireless communicator for use by the emergency services personnel.

23. A system as in claim 22, wherein the emergency call further comprises other information that is descriptive of a medical condition of the user, and further comprising a step of providing the other information for use by the emergency services personnel.

24. A system as in claim 13, and further comprising at least one repeater for repeating the transmission so as to extend the transmission range.

25. A method for operating a wireless communication system, comprising steps

of:

operating a computer to load a set of thresholds into a memory that is accessible by a data processor of a wireless communicator;

operating a set of vital signs sensors that are affixed to a user;

transmitting sensor-generated information to the data processor of the wireless communicator;

comparing the sensor-generated information to the set of thresholds; and

upon an occurrence of sensor-generated information falling outside of a threshold, initiating an emergency call from the wireless communicator to an emergency response center via a wireless communications network, the emergency call including at least some of the sensor-generated information and information describing a current location of the wireless communicator.

26. A method as in claim 25, wherein emergency call also includes other information that is stored in the memory, the other information being related at least in part to a medical condition of the user.

27. A method as in claim 25, and further comprising steps of:

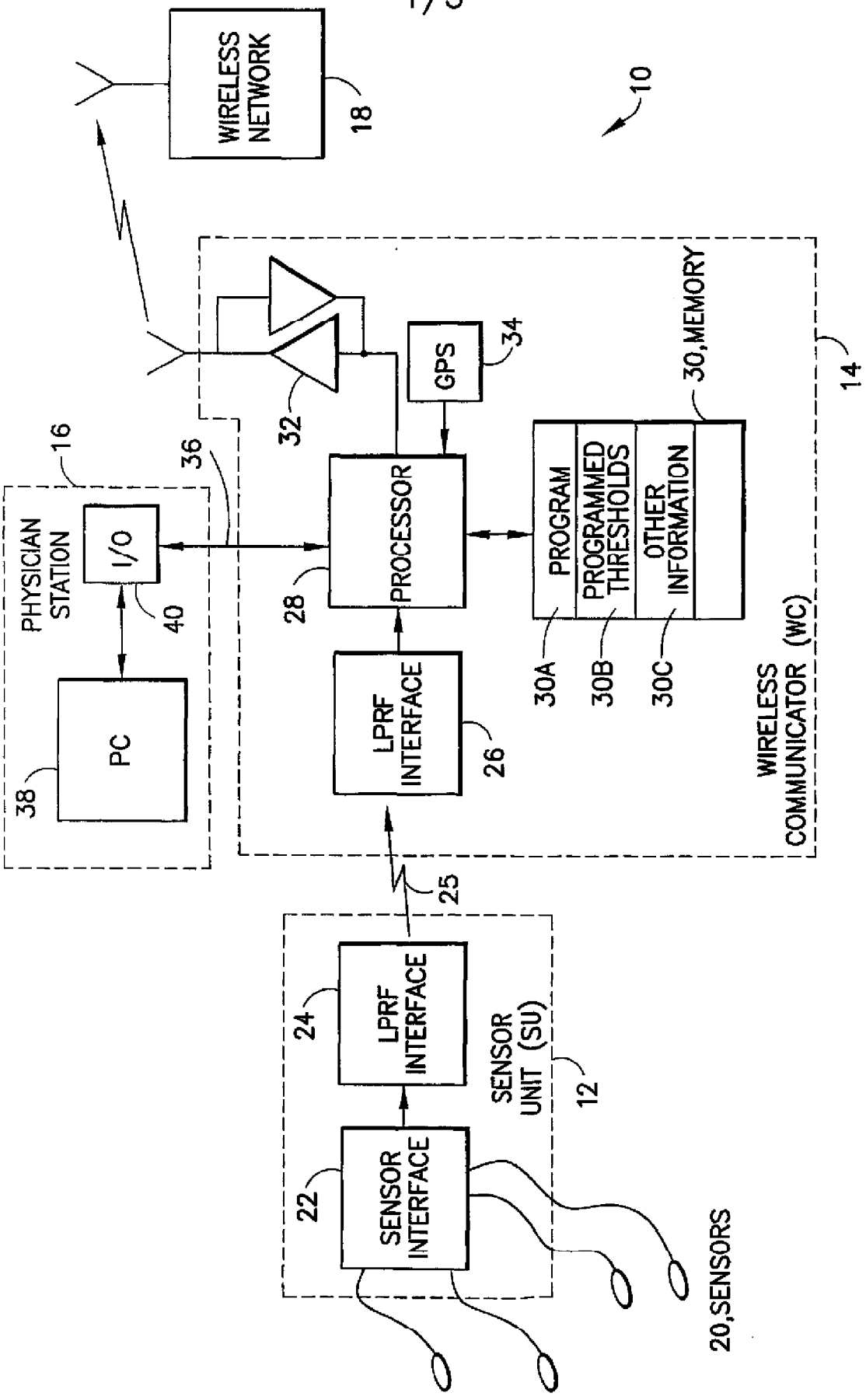
in response to the emergency call, dispatching emergency service personnel to the current location of the user terminal;

continuing to operate the set of vital signs sensors and to transmit sensor-generated information to the wireless communicator; and

transmitting updated sensor-generated information from the wireless

communicator for use by the emergency services personnel.

28. A method as in claim 27, wherein the emergency call further comprises other information that is descriptive of a medical condition of the user, and further comprising a step of providing the other information for use by the emergency services personnel.


WIRELESS NETWORK
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10
14
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GPS
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16
36
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I/O
40
PROCESSOR
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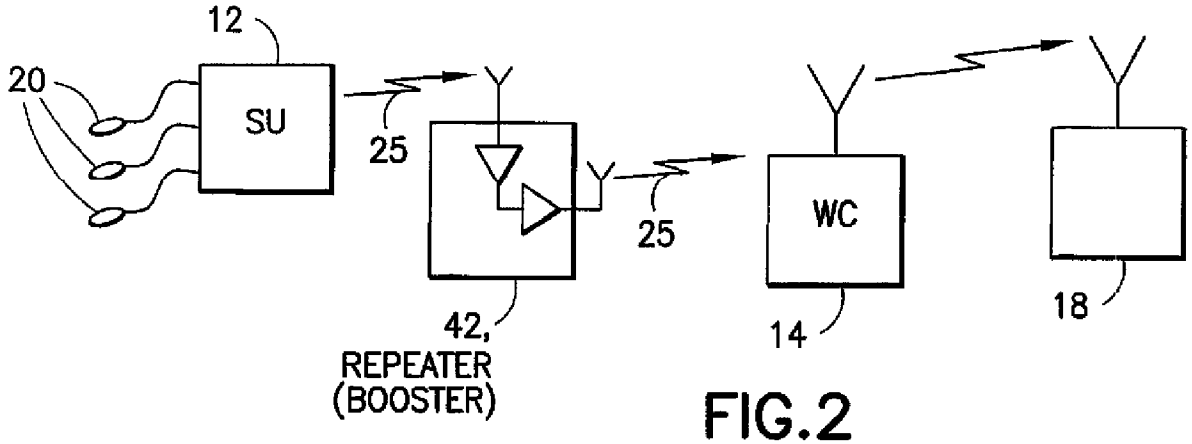
PROGRAM
PROGRAMMED THRESHOLDS
OTHER INFORMATION
30A
30B
30C
38
PC
LPRF INTERFACE
26
WIRELESS COMMUNICATOR (WC)
25
24
LPRF INTERFACE
SENSOR UNIT (SU)
12
22
SENSOR INTERFACE
20,SENSORS

FIG. 1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(BOOSTER)
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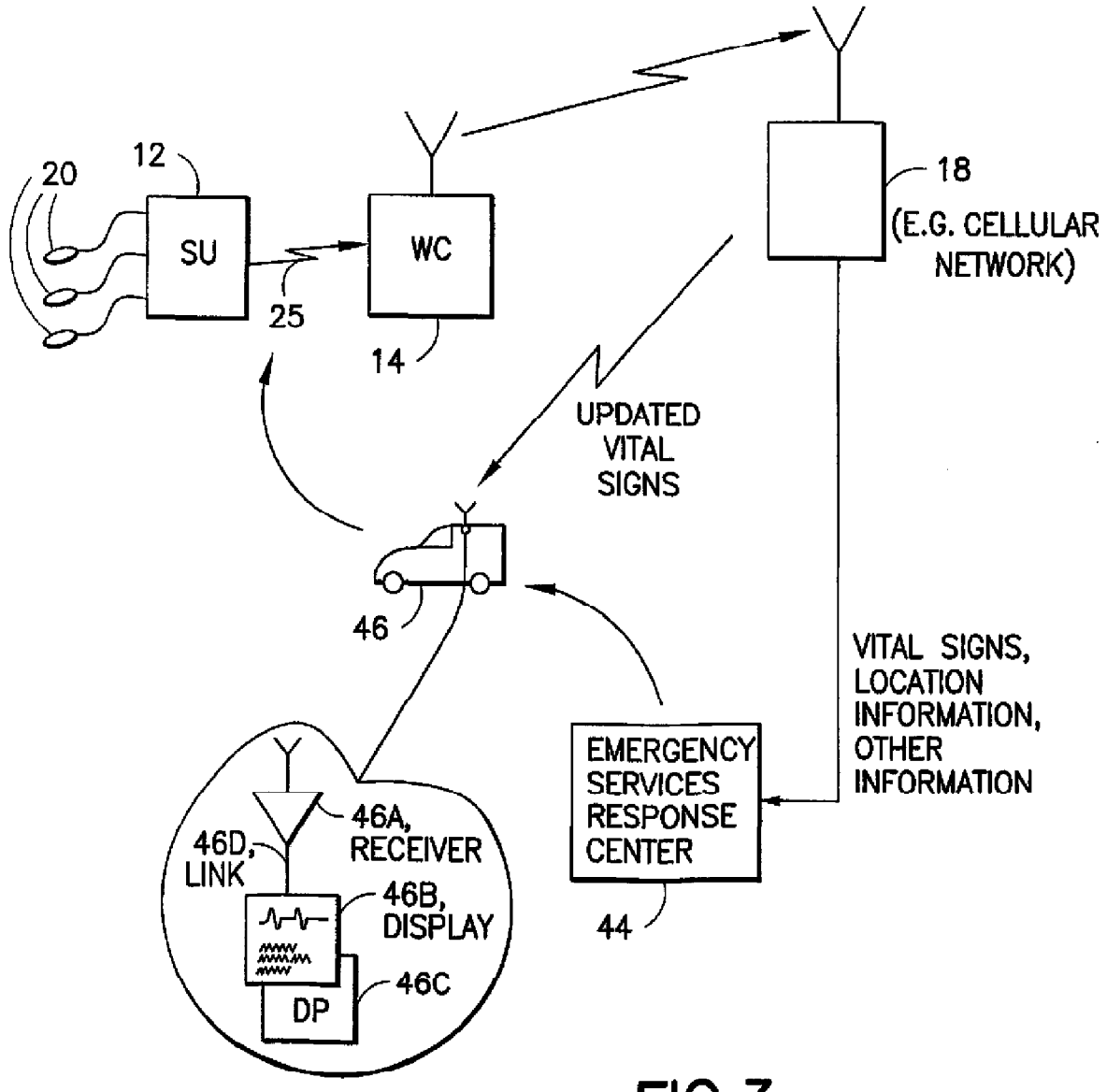
FIG.2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NETWORK)
UPDATED
VITAL
SIGNS
46
VITAL SIGNS,
LOCATION
INFORMATION,
OTHER
INFORMATION
EMERGENCY
SERVICES
RESPONSE
CENTER
44
46A,
RECEIVER
46D,
LINK
46B,
DISPLAY
46C
DP

FIG.3

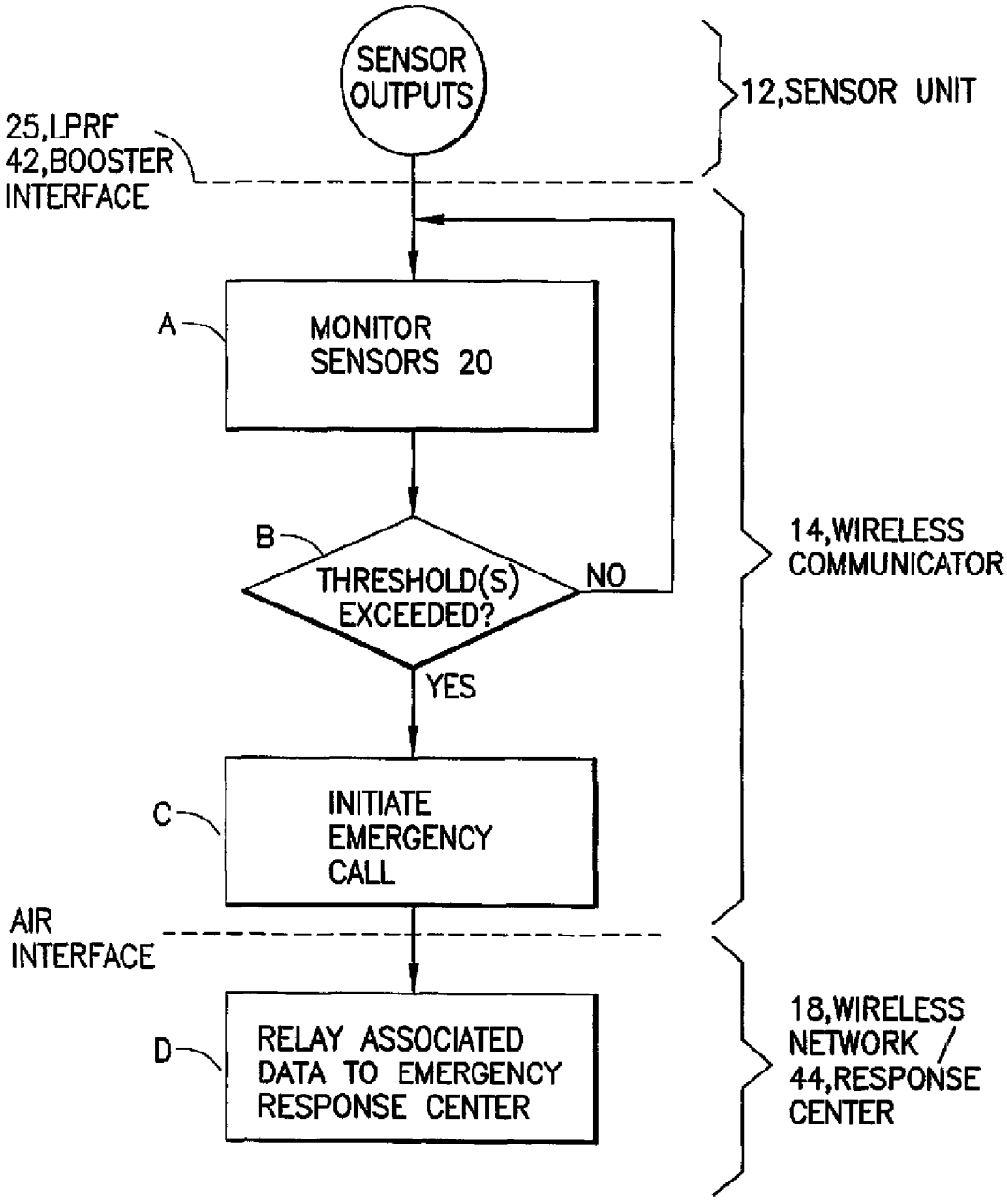
SENSOR OUTPUTS
12,SENSOR UNIT
25,LPRF
42,BOOSTER
INTERFACE
A
MONITOR SENSORS 20
B
THRESHOLD(S) EXCEEDED?
NO
YES
14,WIRELESS COMMUNICATOR
C
INITIATE EMERGENCY CALL
AIR INTERFACE
D
RELAY ASSOCIATED DATA TO EMERGENCY RESPONSE CENTER
18,WIRELESS NETWORK / 44,RESPONSE CENTER

FIG.4